

REMARKS

This application has been reviewed in light of the Office Action dated May 25, 2010. Claims 1-8, 12 and 13 remain pending in this application. Claims 12 and 13 have been amended to clarify their language, and Claims 4 and 5 have been amended to correct self-evident typographical errors therein; these changes are not intended or believed to change the scope of any claim element. Claims 1, 12 and 13 are in independent form. Favorable reconsideration is requested.

First, Applicants gratefully acknowledge the allowance of Claims 1-8. As stated above, Claims 4 and 5 have been amended to correct typographical errors made in their transcription previously (the mis-typing of the exponents as full-sized numerals). These corrections are not believed to affect the allowability of these claims.

Claims 12 and 13 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite, and were also rejected under 35 U.S.C. § 103(a) as being obvious from Japanese Laid-Open JPA 2003-188401 (Yamashita et al.) in view of U.S. Patent 6,787,089 (Kohiki et al.).

According to certain preferred embodiments of the present invention (referred to in the specification as "second" and "third" aspects of the invention), a stacked photovoltaic element comprises the following elements stacked in series: 1) a first unit photoelectric element ("UPE"), 2) an In_2O_3 layer, 3) a ZnO layer, and 4) a second UPE (para. [0025]). These elements are formed in sequence (paragraphs [0072], [0095], [0096], [0152] and [0153]).¹

Claims 12 and 13 recite, among other features, "forming a first layer mainly composed of indium oxide on one of the unit photovoltaic elements by performing physical or chemical deposition on the unit photovoltaic element; and forming a second layer mainly composed of zinc oxide on and in direct contact with the first layer by performing physical or

chemical deposition on the first layer". Applicants particularly note the recitation that the first layer is formed by "deposition on the unit photovoltaic element", and that the second layer is formed by "deposition on the first layer". The language of these claims recites that the second layer is formed by deposition on the first layer, and so that the second layer is formed after the first layer has been deposited on the one UPE. That is, these claims provide that the first layer is on the UPE, and Applicants believe that the claim language means that the second layer cannot begin to be formed until there is a first layer for the second layer to be deposited on.

The foregoing point is the only basis stated in the Office Action for this rejection of Claim 13. Accordingly, Applicants submit that Claim 13 conforms fully to the requirements of Section 112, and withdrawal of the rejection of that claim under that Section is respectfully requested.

With regard to the speed of deposition of the first and the second layers that belong to the intermediate layer (Claim 12), Applicants submit the following observations.

The second and third aspects as described in the specification resolve certain problems or trade-offs conventionally encountered when an intermediate layer of ZnO is provided, sandwiched between two photoelectric units (see paragraphs [0007] - [0013]). Paragraph [0028] states that one preferred feature of this technique is forming the second layer of the intermediate layer faster, or at a higher rate, than the first layer:

"[0026] In the method of the second aspect, the second layer is formed to be thicker than the first layer.

"[0027] In the method of the second aspect, the first layer is formed to have a thickness of 1 nm or more but 50 nm or less.

"[0028] In the method of the second aspect, the *second layer is formed at a rate higher than that of the first layer*.

"[0029] In the method of the second aspect, the second layer is formed at a temperature lower than that of the first layer. [Emphasis added.]"

It should be noted that the higher rate of formation is one factor that is mentioned as being relevant here, and the relative thicknesses of the two layers and the temperatures used respectively in the formation of the two layers, are other such features.

Example 3 describes in detail one example of the manufacture of a stacked photovoltaic element (paragraphs [0140] - [0162]). Paragraphs [0151] - [0154] state:

"[0151] Indium/tin oxide was sputtered onto the substrate with a mixed [*sic*; mixture] of tin oxide (3% by weight) and indium oxide (97% by weight) as the target.

"[0152] It was deposited under the conditions of substrate temperature: 170 °C., argon gas (as an inert gas) flow rate: 50 cm³/minute (normal conditions), oxygen gas flow rate: 0.2 cm³/minute (normal conditions) and pressure in the deposition chamber: 200 mPa, where a DC power of 10 W was *applied for about 100 seconds to deposit the layer to a thickness of about 10 nm* after the electrical connection was changed to the indium/tin oxide target (diameter: 6 inches). Thickness of the layer was estimated by the predetermined relationship between thickness and deposition time.

"[0153] Then, the zinc oxide layer was deposited by sputtering in the same apparatus, after the target was changed to that of zinc oxide.

"[0154] It was deposited under the conditions of argon gas flow rate: 30 cm³/minute (normal conditions), oxygen gas flow rate: 2 cm³/minute (normal conditions) and pressure in the deposition chamber: 2 x 10⁻¹ Pa, where a DC power of 100 W was *applied for about 5 minutes to deposit the zinc oxide layer to a thickness of about 100 nm*, after the electrical connection was changed to the zinc oxide target (diameter: 6 inches) and the substrate was heated to 120 °C. [Emphases added.]"

Applicants note that according to this detailed example, the second layer (zinc oxide) is deposited over a five-minute period, to a thickness of 100 nm, and so at 1/3 nm/sec., whereas the thinner first layer (indium/tin oxide) is deposited over a shorter period of only 100 seconds, and to a thickness of only 10 nm, and so at 1/10 nm/sec. Applicants submit that in view of the statement in paragraph [0028] a person of ordinary skill would understand from this example that what is intended by paragraph [0028] is that the second layer is formed faster - in

terms of thickness per unit time - than is the first layer. Thus, Applicants submit that one of ordinary skill in the art would understand from the claim language, when read in light of the specification, that the thickness per unit time is the parameter being referred to by this claim language. Accordingly, it is believed that Claim 12 also conforms fully with the requirements of Section 112, and withdrawal of the rejection under that Section is respectfully requested. Nonetheless, Applicants are willing to modify the language of Claim 12 to make it more explicit on this point (for example, by changing "rate higher" to --rate higher in nm per second-- or the like), if the Examiner believes that further clarification would be useful.

With regard to the prior-art rejection of Claims 12 and 13, Applicants submit herewith two sworn translations, of Japanese priority applications 2003-084535 and 2003-084781, both filed on March 26, 2003 (a sworn translation of their third priority application is also submitted, but is relied on at this time, as its filing date is in 2004). Applicants submit that Claims 12 and 13 are entitled to benefit of a date prior to the July 4, 2003, laying-open date of *Yamashita*, and that *Yamashita* therefore is not available as prior art against this application. Withdrawal of the prior-art rejection of Claims 12 and 13 is therefore respectfully requested.

In view of the foregoing amendments and remarks, Applicants again respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

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